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A NEW SPECIES OF POLYCHAETOUS ANNELID (ARABELLIDAE) PARASITIC
IN *DIOPATRA ORNATA* (ONUPHIDAE) FROM SOUTHERN CALIFORNIA

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ABSTRACT: A new species of polychaetous annelid of the family Arabellidae is described. Various sizes were found parasitic in the coelomic cavity of a single specimen of the onuphid polychaete *Diopatra ornata* collected near Port Hueneme. Movement of the parasite may occur through the septal walls of the host but not laterally through the dorsal or ventral mesenteries.

Polychaetes are known to occur primarily as free living or sedentary forms and occasionally as commensals but, rarely are they found as parasites. Parasitism by arabellid polychaetes, which in some cases may represent only a transitory stage in their development, occurs principally in other polychaetes. A review of the literature by Pettibone (1957) lists ten species of parasitic arabellids of which nine species are parasitic in members of the polychaete families Eunicidae, Onuphidae, Terebellidae, Syllidae, and Spionidae; the remaining species occurs in the echiuroid family of Echiuroidea. Five species, or half of those reported, are parasitic in eunicids and onuphids. Both host families are closely related to the arabellids and all three are members of the superfamily Eunicea. The instances of parasitism by arabellid polychaetes within other onuphid polychaetes as reported by Pettibone includes the following records: *Drilonereis bendicti* (Pettibone) within *Onuphis magna* (Webster), numerous specimens of *Notocirrus spiniferus* (Moore) from a single specimen of *Diopatra cuprea* (Bosc), (Allen, 1952), and a single specimen of *Drilonereis caulleryi* (Pettibone) in an anterior fragment of *Onuphis* (*Nothria*) *conchylega* (Sars). In addition Hartman (1968) found *Arabella iricolor* (Montagu) in specimens of *Diopatra ornata* (Moore).

In 25 specimens of the tube worm *Diopatra ornata* collected near Port Hueneme, California in May 1972, one was found to contain several

size classes of a new species of endoparasitic arabellid, which is described herein. This is contribution No. 10 of the Santa Catalina Marine Biological Laboratory.

RESULTS

One specimen of *Diopatra ornata* was observed to contain a segmented worm moving under its body wall. An incision was made along the dorsolateral margin of several parapodia located midway along the body which allowed removal, with forceps, of a small polychaete. The host specimen, a female, consisted of 195 segments complete with pygidium and was 10 mm wide and 150 mm long. Four parasites were eventually removed from the host and some were fixed while in the host for subsequent sectioning. The largest specimen was 60 mm long, 1.0 mm wide with 241 segments. The body was heavily pigmented and the head had a functional jaw apparatus and two pairs of eyespots. The smallest specimen was 20 mm long and 0.5 mm wide and lacked eyespots, jaw apparatus, and pigmentation. The largest specimen exited from the 33rd segment of the host without assistance. The host displayed no excitation or unusual behavior during this event. The escape from the host may have occurred via one of the nephridiopores which are well-de-

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veloped anteriorly, as no apparent tissue damage was observed.

Freed parasites and segments of the host containing additional parasites were fixed in 10 percent formalin and Dubosq Brasil. The latter were embedded in Paraplast, cut at 8μ and stained in Erlich's hematoxylin and eosin, using the method of Humason (1967). The parasite was not in the gut cavity but, appears to be confined to the coelomic cavities of the host (Fig. 1A). Movement of the parasite had occurred through the septal walls of the host but not laterally through the dorsal or ventral mesenteries (Fig. 1B).

The host female contained significantly fewer oocytes in the coelom than did *Diopatra* females unafflicted with the parasite. The gametic products may represent the major food source for the later growth stages of the parasite which are complete with a functional jaw apparatus and digestive tract. Consumption of the reproductive products would also provide additional space within the coelomic cavity of the host for the parasitic stages. Smaller or juvenile parasites, which lack jaws may be unable to actively consume the thick shelled oocytes, but could be supported by consumption of the coelomic fluid or absorption of dissolved nutrients from it.

The well-developed eyes and body pigmentation of the largest specimen indicate an active free living stage in the life cycle of the parasite. The time spent within the coelomic cavity and the means of entering the host organism are unknown.

The true incidence of infection in the population of *Diopatra ornata* located near Port Hueneme cannot be predicted from the small sample of 25 specimens of which only one was found to be infected. However, it is of interest that several hundred specimens of *Diopatra ornata* from a population located near Catalina Island have been examined and none of the specimens were infected.

Arabella endonata, new species

Description: The holotype is complete and has 241 segments. It is 60 mm long and 1.0 mm wide with-

out parapodia. A brownish pigmentation covers the ventral and dorsal portion of the body, but the parapodia are unpigmented. Smaller specimens completely lack pigmentation. The ovate prostomium is slightly longer than wide, with a pair of faint longitudinal grooves ventrally. Two pairs of dorsal eyespots are present in a transverse row. The outer pair is slightly larger and appears to be subepidermal (Fig. 2A).

The first two segments are apodus. Parapodia are similar in all setigers. The presetal lobes are rounded while the well-developed postsetal lobes are digitiform and directed slightly dorsally. The notopodium consists of two dorsolateral papillae supported by a single stout notopodial aciculum. The neuropodium is also supported by a single aciculum (Fig. 2B).

Setae are bilimbate, doubly curved, and with a fine tip. The wings are smooth or finely denticulate along the border. The main shaft is striated (Fig. 2C). Three to four setae are present in a parapodium.

The mandibles are triangular and fused (Fig. 2D). The paired maxillary carriers are separate along their entire length except near the posterior end where they appear to be joined; each carrier has a spatulate anterior end. The presence of an unpaired carrier was not noted. All of the maxillary plates are distally falcate. The maxillary formula of the type specimen is $10+10 - 6+5 - 4+4 - 1+1$. The left maxilla I has a more pronounced falcate or hooked condition (Fig. 2E) than the apposing maxillary tooth.

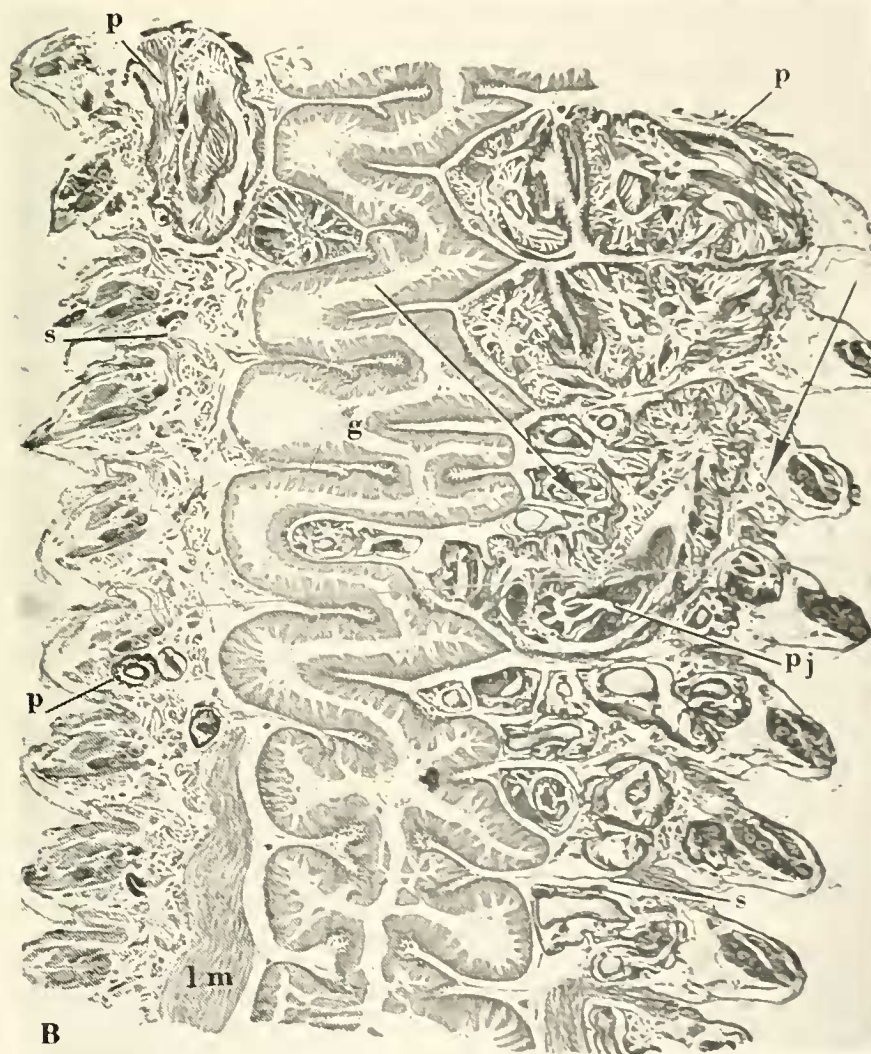
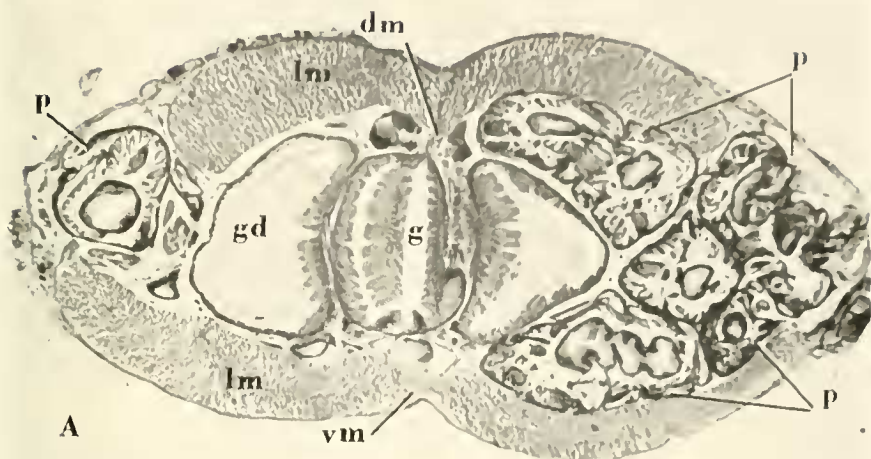
The holotype and paratypes have been placed in the collection of the Allan Hancock Foundation, University of Southern California, Los Angeles, California.

Distribution: The host organism containing the type specimen was collected from sandy silt substrate at a depth of 50-60 feet off the southern California coast near Port Hueneme.

Etymology: The name *Arabella endonata* (*endo*, from the Greek *end* = within, and *nata*, a contraction of the specific name of the host *Diopatra ornata*) is appropriate as the species is endoparasitic within *Diopatra ornata*.

Remarks: Aside from the parasitic nature of *Arabella endonata* it is easily separated from other free living species of *Arabella* previously identified from California and Western Mexico (Fauchald, 1970; Hartman, 1944). *Arabella endonata* is distinguished from *Arabella geniculata* (Claparede), *A. iridescens* (Treadwell), *A. mimetica*

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 Figure 1. A. Cross section through segment 100 of *Diopatra ornata* showing parasites within the coelomic cavities of the host. Dorsal mesentery (dm), ventral mesentery (vm), parasite (p), gut (g), gut diverticulum (gd), longitudinal muscle (lm), and dorsal blood vessel (dv). B. Longitudinal section of several genital segments of *Diopatra ornata* showing parasite penetration through a septal wall of the host (arrows). Septum (s), parasite (p), parasite jaw apparatus (pj), gut (g), and longitudinal muscle (lm).



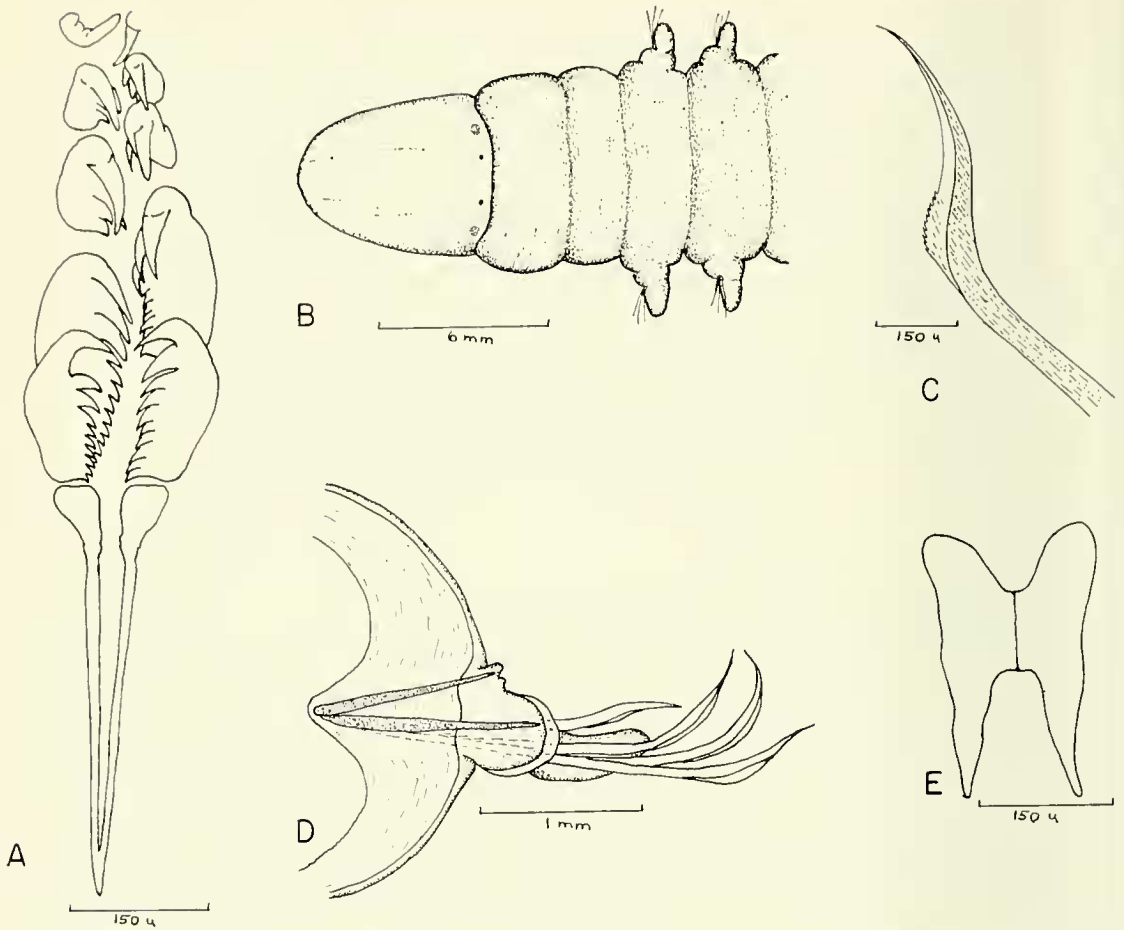


Figure 2. *Arbella endonata*, new species. A, maxillary plates and carriers; B, anterior end in dorsal view; C, bilimbate seta; D, setiger 100 in anterior view; E, mandibles.

(Chamberlin), and *A. novecrinita asymmetrica* (Crossland), by its possession of eye spots. *Arabella semimaculata* (Moore) and *A. iricolor* (Montagu) with 2-3 neuropodial acicula are distinct from *A. endonata* which has only one neuropodial aciculum. The specimens of *Arabella iricolor* reported by Hartman (1968) in *Diopatra ornata* are unfortunately no longer available. Hooded setae characteristic of *Arabella mutans* (Chamberlin) and transverse rows of fine teeth on the setae of *A. pectinata* (Fauchald) are key features not found in *A. endonata*. In addition all of the aforementioned species differ significantly in their maxillary formulae.

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DESCRIPTIONS OF TWO NEW SPECIES OF *EUSCHOENGASTIA* (ACARINA: TROMBICULIDAE) FROM CALIFORNIA AND BAJA CALIFORNIA NORTE, MEXICO

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ABSTRACT: Two new species of *Euschoengastia* are described: *E. hardyorum* n. sp., off *Dipodomys microps* from Death Valley National Monument, 4 mi E Wildrose Ranger Station, Inyo Co, California, and *E. marginalis* n. sp., off *Neotoma lepida* from Lower Covington Flat in Joshua Tree National Monument, Riverside Co, California. Included is information on host-chigger relationships, ecology, seasonal occurrence, and distribution of both species.

Concentrated studies of North American *Euschoengastia* have revealed two new species which are described below. One has been taken only from heteromyid rodents in Inyo County, California, and is similar to *E. romola*, described by Brennan and Jones (Wasmann J. Biol., 12:155-194, 1954) from Monterey County, California. The second resembles several other western species of *Euschoengastia* and usually was found on *Neotoma lepida* from northern Baja California del Norte, Mexico, northward into Inyo County, California. Both species were initially described in an unpublished masters thesis submitted to California State University, Long Beach, by R. E. Somerby entitled "Chiggers of the Genus *Euschoengastia* (Acarina, Trombiculidae) from Southern California," ix + 141 pp., June 1966, and are reinterpreted here.

The holotype and one paratype of each species will be deposited in the collection of the Rocky Mountain Laboratory, Hamilton, Montana. Additional paratypes will be deposited in appropriate collections; other paratypes and specimens examined are in the chigger research collection at California State University, Long Beach, California.

The descriptions of the new species are based upon the holotype, paratypes, and other specimens examined. All measurements are in microns.

Under specimens examined, the enumeration in parentheses following a host name or collection date refers to the number of larvae examined; the second enumeration following the slash refers to the number of hosts examined: (7) or (17/2).

Euschoengastia hardyorum, new species

Figure 1

Types: Larvae, holotype and 48 paratypes from Death Valley National Monument, 4 mi E Wildrose Ranger Station, Inyo Co, California; holotype and two paratypes from *Dipodomys microps*, original number RBL621105-12, collected by Ross Hardy on 2 November 1962 (R. B. Loomis, cataloger); 38 paratypes from nine *Dipodomys microps* (RBL621105-3,-4,-5,-6,-7,-8,-10,-11,-13); and eight paratypes from two *Perognathus formosus* (RBL621105-1,-2), same locality, date, and collector as above.

Diagnosis: ALs < PLs; palpotibial claw pentafurcate; 2 genualae I, without subterminal I, parasubterminal I, genuala III and tibiala III; all dorsal body setae with large conspicuous ventrolateral setules and shorter dorsal setules.

Description of holotype (unless otherwise noted, averages and extremes of 11 paratypes in paren-

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